

Philosophical Instruments, LLC

16th ICCRTS

“Collective C2 in Multinational Civil-Military Operations”

Organized Cognition: Theoretical Framework for Future C2

Research and Implementation

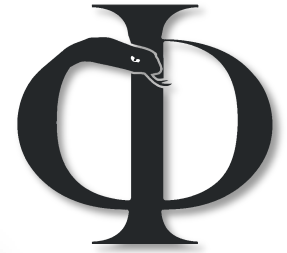
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Command and Control



Information Denial	Information Influence	Information Corruption	Information Destruction			
Operations Security	Deception	Psychological Operations	Electronic Warfare	Cyber Warfare	Physical Destruction	
Cultural Influence Operations	Diplomacy	Other Influence Operations	Covert Operations	Limited Conflicts	Large Scale Campaigns	Total Wars

Historical Perspective: C2 and the Human Factor (1/2)



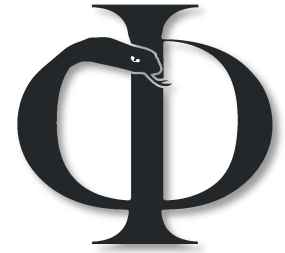
- **Coup d'Oeil**

- An essential virtue in battle champions: “**quick recognition of a truth that the mind would ordinarily miss or would perceive only after long study and reflection**” (Clausewitz, 1832) or “**seize, as it were, with a glance, the advantages or disadvantages which may arise from the situation of ground or troops, and to single them out from all other objects**” (Bismarck, 1855).
- There is no deterministic way, other than **testing commanders in battle**, to identify a-priori individuals who possessed Coup d'Oeil.

- **Ace Factor**

- A quality possessed by a “tiny minority [who] tends to **run up large scores at the expense of the less gifted majority** (Spick, 1988).
- Approximately **40% of all aerial combats** from WWI to the end of the Korean conflict were **won by roughly 5% of fighter pilots** (Spick, 1988).
- Nearly **80% of all lost aerial combats** in Southeast Asia between 4/3/1965-7/27/1967 were **associated with pilots unaware of being attacked** (Attincilo, 1967, 1968, 1969).
- There is no deterministic way, other than **exposing pilots to air fights**, to identify a-priori individuals who possess the Ace-factor.

Historical Perspective: C2 and the Human Factor (1/2)



- **Coup d'Oeil**

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Historical Perspective: C2 and the Human Factor (2/2)



- **Situational Awareness (SA)**

- Coined as a concept aiming to explain **the essence of the Ace Factor** (Spick, 1988).
- Canonized as the measurable ability associated with the “**perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future**” (Endsley, 1988).
- Extended from aviation to general tasks and from the individual to the communal levels and has been **considered a key factor of effective C2**.
- Considered **ill-defined concept** that “**does not point to or bring extra psychological constructs beyond those already available**” (Patrick & Morgan, 2010).

- **Observe, Orient, Decide, Act (OODA)**

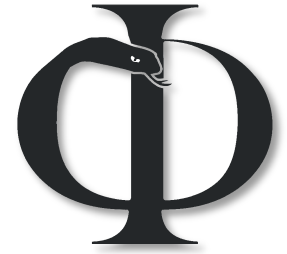
- Stemmed from the **fast decision making cycles** required in **combat aviation** and evolved later to the realm of **C2** (Boyd, 1986, 1987, 1996).
- Winning requires **execution** of **OODA** loops **faster** than the **competition** thus forcing it to **react** while **denying** it **sufficient time** for **planned** actions (Boyd, 1986, 1996).

Historical Perspective: C2, Technology, and the Human Factor

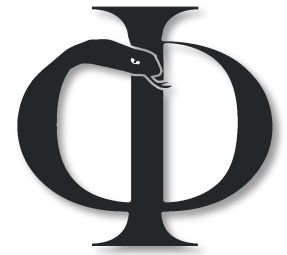


- Due to the professional tendency to think and display behaviors within strict structured contexts, computerized environments overwhelm and **impair** the natural ability of human operators to **adjust** to changes, survive technical malfunctions, handle complexity, reason, and make sense.
- The **variety of embodiments** (natural, remote, or conceptual) require **specialized user interfaces** for operators who are physically located in combat environments or interact remotely with command shelters
- **Imperfections in communications** and information systems put operators in doubt whether their information was **updated and accurate**
- **Oversimplification** of the battlefield's complexity, induced by **technologically-tunneled thinking** and amplified by **technologically-enforced groupthink**.
- Institutional and technological constraints led to **prolonged development and deployment cycles**, thus, the adaptation of C2 procedures and technologies often **lags behind** the changing environments and limits the effectiveness of C2 in operations

Organized Cognition

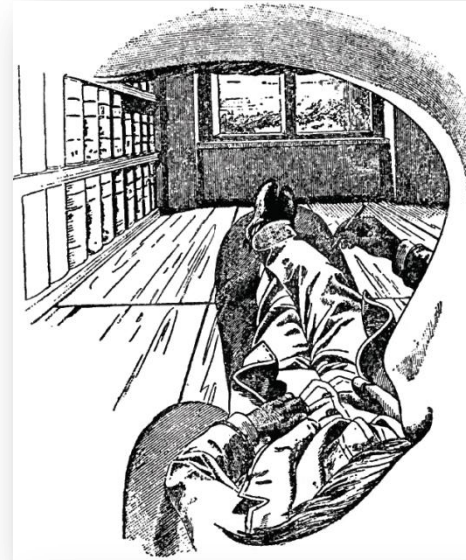


- The notion of **Organized Cognition (OC)** is a thematic lens for illustrating the concept of C2 as an intentionally coordinated interplay between **individual, social,** and **cultural** instances of **awareness, decisions,** and **actions partially-mediated** by **technology** within the (military) organizational context.
- OC is based on two key concepts focused on the **subjective** experience
 - **World Constitution**
 - **Natural Attitude**
- OC refers to **intentional individual** and **collective** efforts to **obtain unbiased knowledge** of **semi-static** and **dynamic** aspects of the **constitution** of the **world** and the **natural attitude** of individuals, societies, or cultures.



World Constitution

The concept of **World Constitution (WC)** refers to the **subconscious and conscious modes of conceiving the given world** as a continuous flow of anticipated percepts (**protensions**) that materialize to actual percepts and decay into recollections (**retentions**). All anticipated percepts derive from recollections of actual or socially-inherited experiences, and for this reason, the constituted world is always a combination of **semi-static and dynamic aspects of the actuality**.



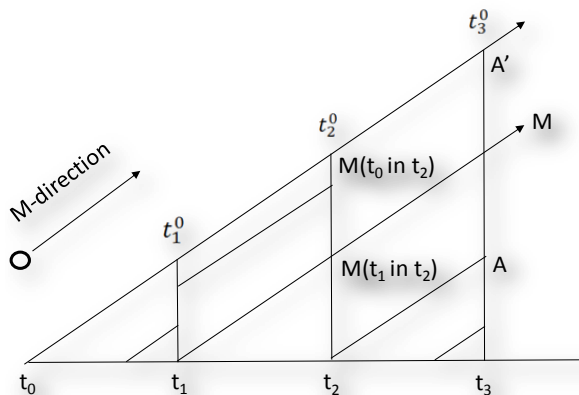
Left monocular World Constitution

Reproduction from "The analysis of sensations, and the relation of the physical to the psychical" (C. M. Williams & S. Waterlow, Trans.) by E. Mach, 1914, p. 19. Publication is in the public domain.



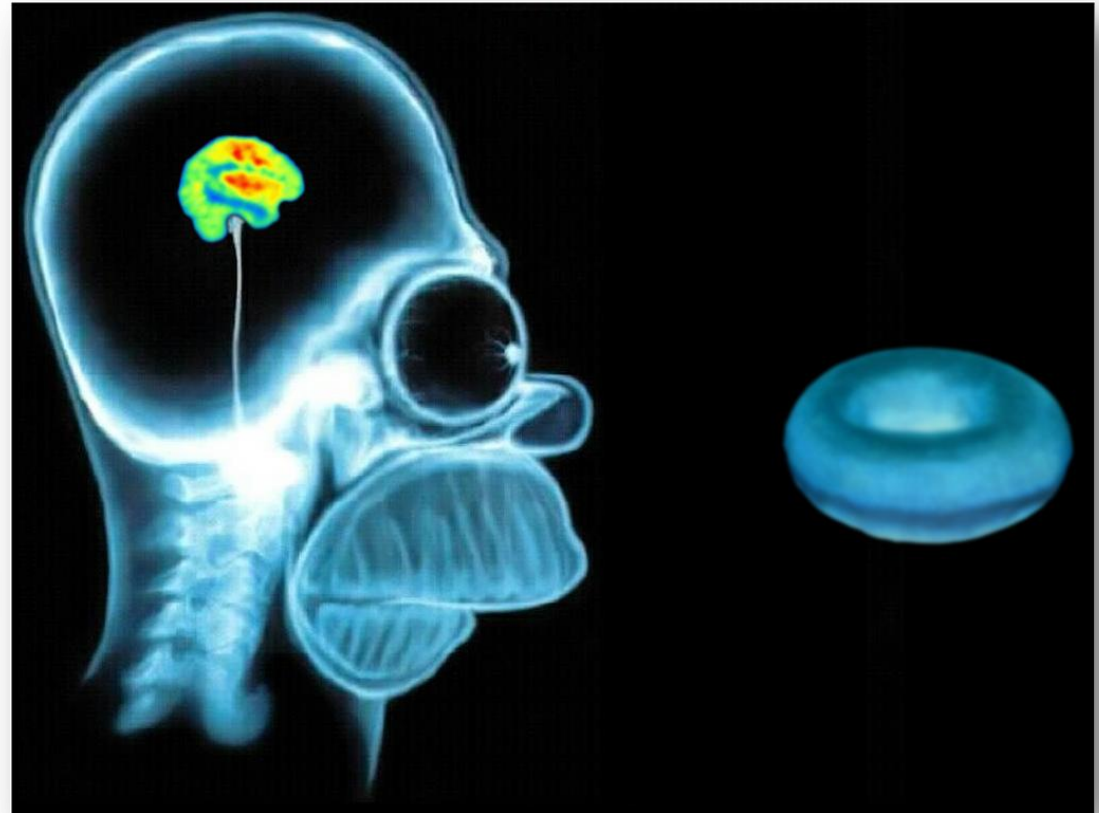
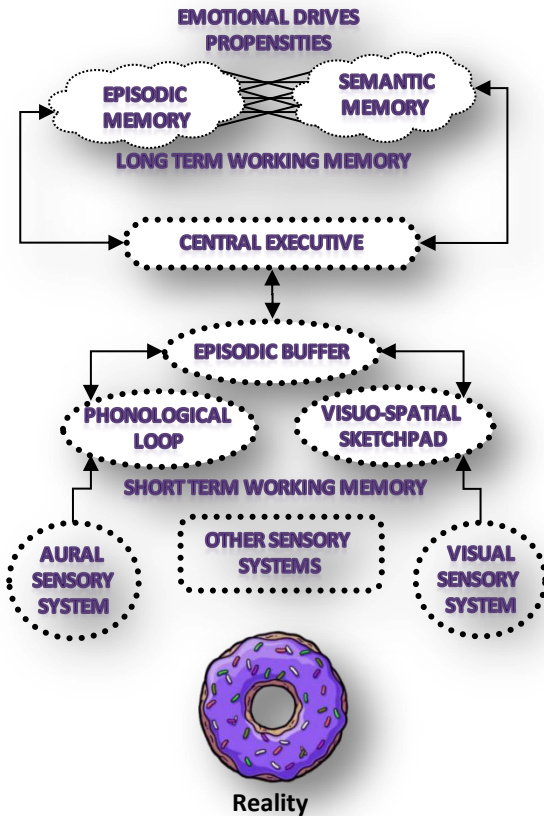
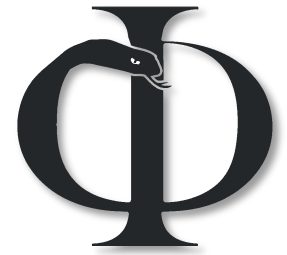
Left monocular visual experience

Processed from "The analysis of sensations, and the relation of the physical to the psychical" (C. M. Williams & S. Waterlow, Trans.) by E. Mach, 1914, p. 19. Publication is in the public domain.



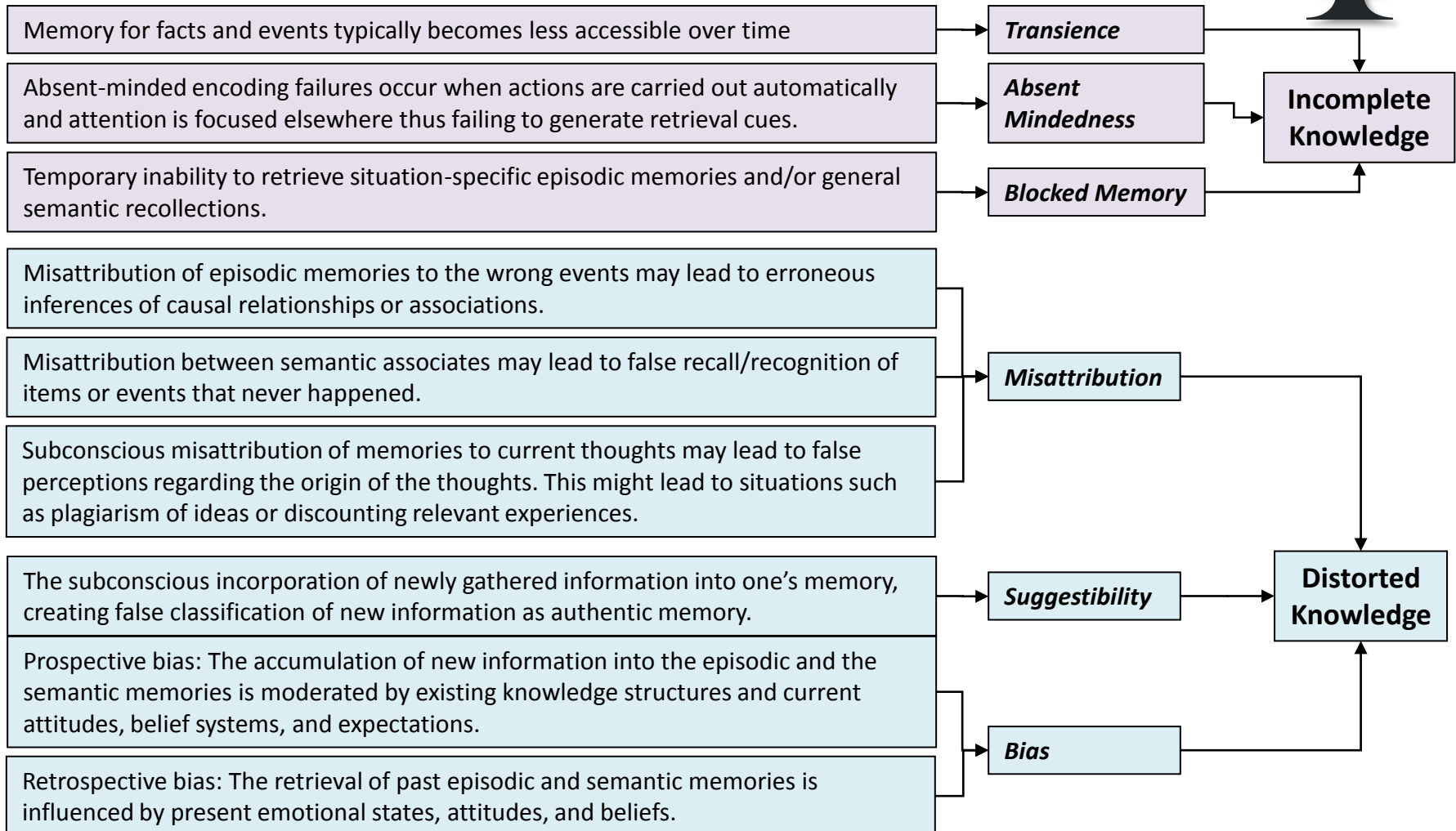
Husserl, E., *The phenomenology of the consciousness of internal time.* 1991/1928, Dordrecht, The Netherlands: Kluwer Academic Publishers.

Equivalents of Retention and Protention



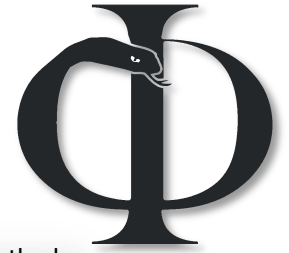
Model inspired by Baddeley, A.D., D. Chincotta, and A. Adlam, *Working memory and the control of action: Evidence from task switching*. *Journal of Experimental Psychology: General*, 2001. **130(4)**: p. 641-657. Baddeley, A.D. and J.D. Larsen, *The phonological loop unmasked? A comment on the evidence for a "perceptual-gestural" alternative*. *The Quarterly Journal of Experimental Psychology*, 2007. **60(4)**: p. 497-504. Baddeley, A.D. and R.H. Logie, *Working Memory: The Multiple Component Model*, in *Models of working memory: Mechanisms of active maintenance and executive control*, A. Miyake and P. Shah, Editors. 1999, Cambridge University Press: Cambridge, UK. p. 28-61.

Limitations of Retention and Protention

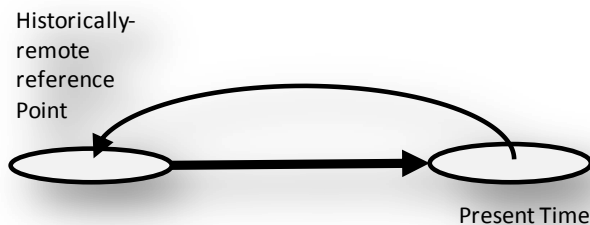
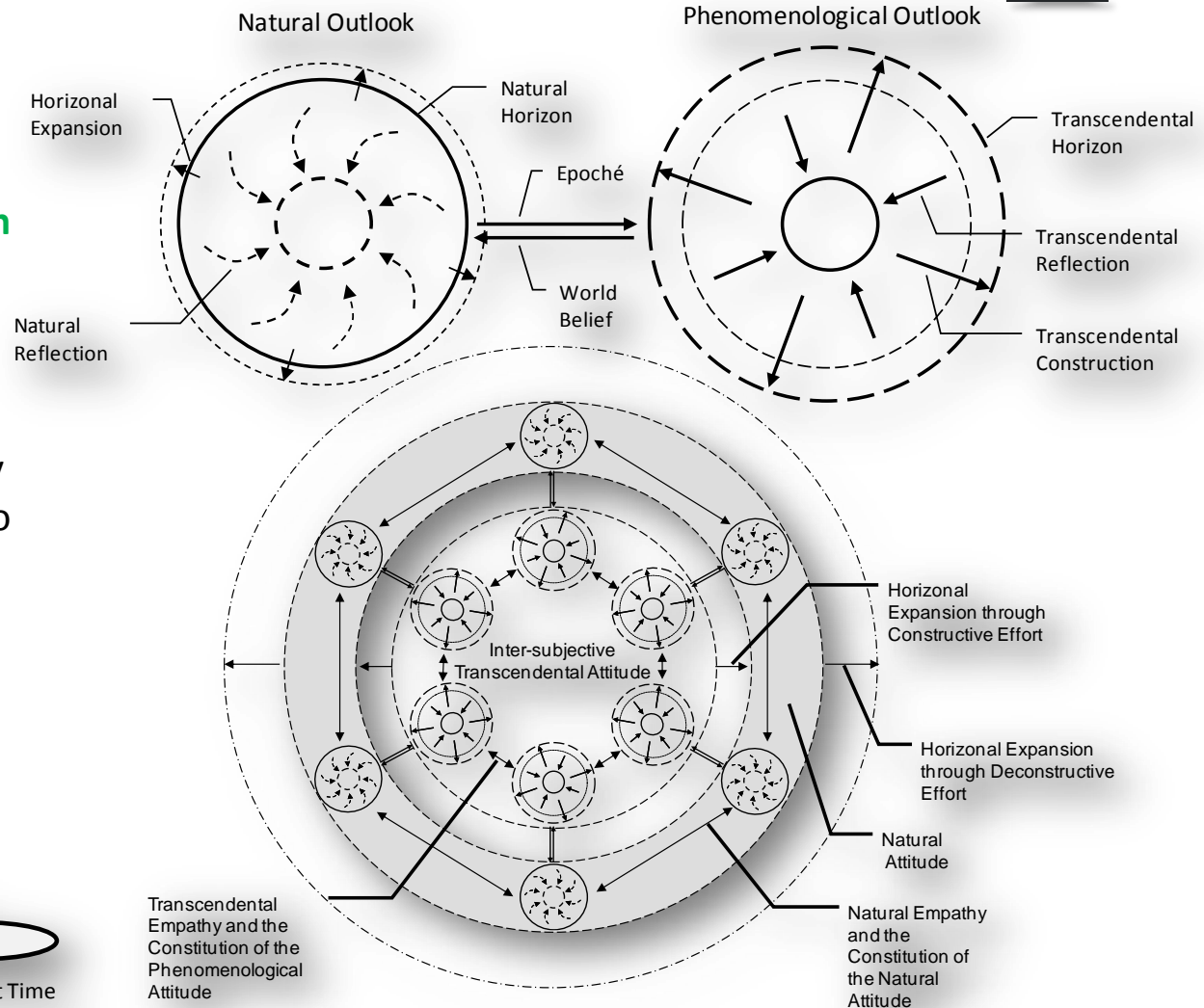


Schacter, D. L. (1999). The seven sins of memory: Insights from psychology and cognitive neuroscience. *American Psychologist*, 54(3), 182-203.

Natural Attitude



The regularly-occurring WC of the daily life is contained and confined within the horizons of the known. The **collection of all that is commonly known in a professional society or a culture** is broadly referred to as the **Natural Attitude (NA)** or the Common Sense of that society or culture. While many aspects of the NA are visible to the dwellers of a particular culture, some basic aspects remain unnoticeable and therefore unquestionable.

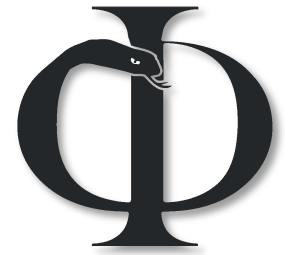


OC , Coup d'Oeil, and the Ace Factor

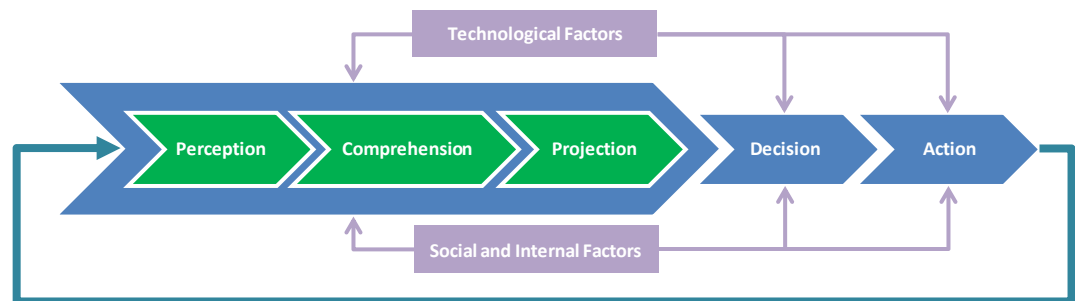


- Coup d'Oeil and the Ace-factor **cannot** explain the phenomenon of **exceptionally gifted operators**.
- Coup d'Oeil and the Ace-factor may refer to a natural ability to **inhibit protentions, enhance** the living experience of the **present time**, and **reconstitute** the world without heavy reliance on the NA.
- Exceptionally gifted operators may **frame** and **reframe** their WC **without** complete reliance on the **NA** while being aware of its existence.
- Further research required.

OC and SA



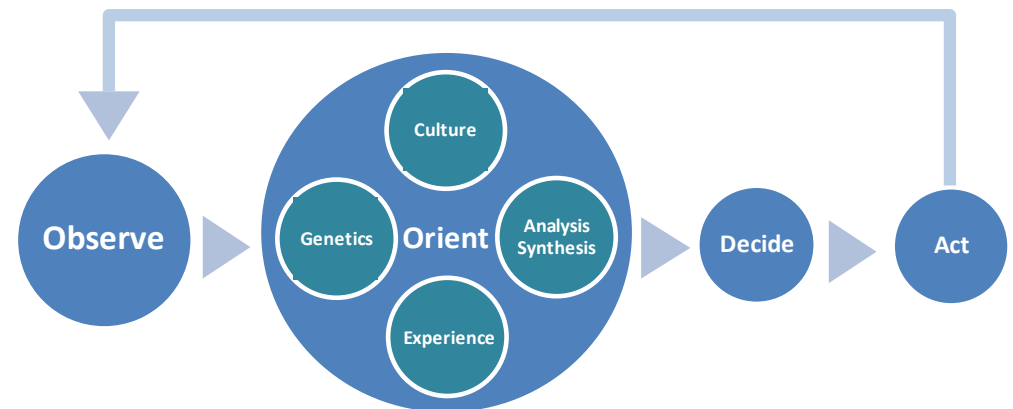
- SA started as the **essence** of the **Ace Factor**
- SA assumes existence of an **ideal representation** of a **reality** that its knowledge would support correct decisions and actions in a timely manner.
- SA focused on the level of **congruence** between **individual** and **NA-based** framed **representations** of the **reality** within **given contexts**.
- The common interpretation of SA refers to the **measurable ability** to adjust the **natural WC** and **operate within** the **NA** through **technologically-supported representations** of the **reality**.
- Since the relationship between an **actuality** and its **conception** depends on the **NA** that shaped the conception, the concept of SA **cannot transcend** the NA and remains **confined** within its **horizon**.
- Further research required.



OC and OODA



- OODA emphasized the need for
 - **unbiased interaction** with the **situation**
 - **short decision-action cycles**
 - **decentralized organizations**
- Boyd's motives for **omitting** the **historical scale** of the **semi-static** structures of NA remain unknown.
- The **missing** link between OODA and the concept of OC is the **awareness** of the **unnoticeable** flow of the **NA** and its powerful affect on the WC of individuals and societies.
- Further research required.



OC in the Development and Deployment of C2 Technologies (1/2)



- How we do it today?
- **Outside** the operational NA
 - Planned by **non-operators**
 - Triggered by **technological** and **operational opportunities/necessities**
 - **Slower** than the events
 - **Not** always **relevant**
- **Within** the operational NA
 - **Sporadic** changes triggered by **operational necessities**
 - Sometimes **following** the events and **relevant**.

OC in the Development and Deployment of C2 Technologies (2/2)

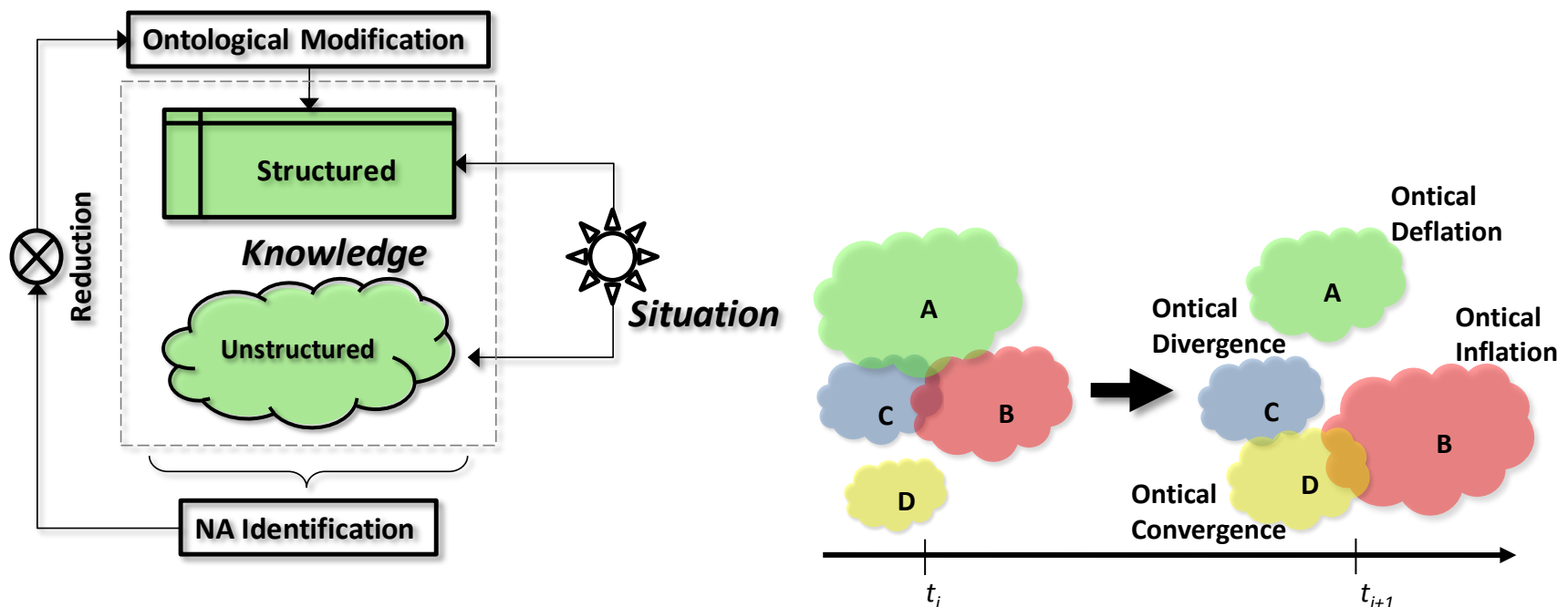


- How can we do it tomorrow?
 - Maintain **higher rate** of **change** closer to the **occurring** events by operating concurrently **within** and **outside** the operational NA.
 - Apply managers, designers, and developers who experienced **operations** prior to their **development** assignment.
 - Development processes that emphasize **progress** through **experimentation** instead of speculative, overly-structured, and elaborated processes.
 - Gain understanding of the **NA** in **military organizations**.
 - Perceive and anticipate **slow changes** within organizations and in their competitive landscape that may **inflict** operational and technological **surprises**.
 - Further research required.

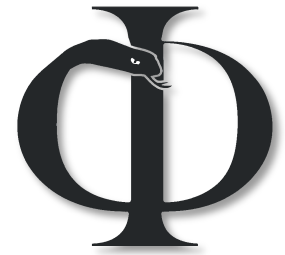
OC and the Design of Future C2 Systems (1/2)



- Support **mitigation** of the **NA**
- Support multiple structures and semi-structures of meaning while remaining in concert with other interpretations of the same reality
- Further research required.

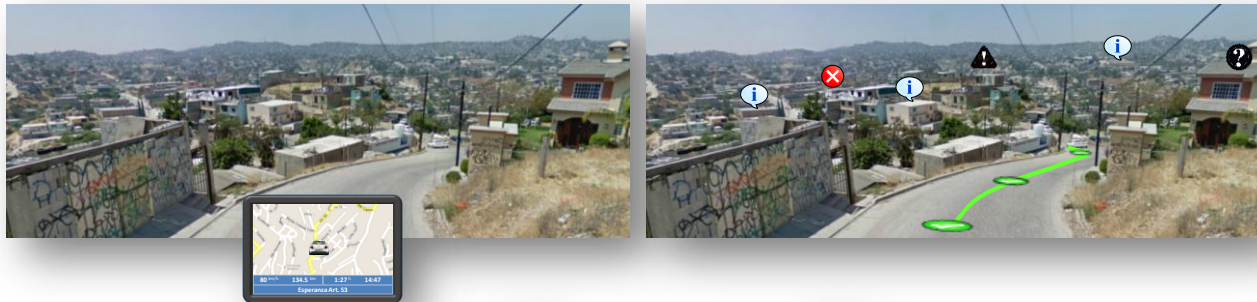


OC and the Design of Future C2 Systems (2/2)



- **Compatibility** with **natural world constitution**
- **Specialized context-situated** tools and visualizations
- **Recovery** after **technical failure**
- Further research required.

Natural Embodiment – Disruptive Display

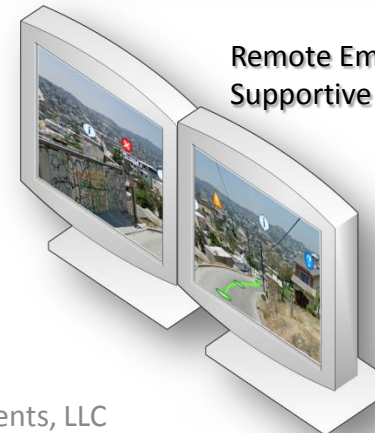


Natural Embodiment – Immersive Display

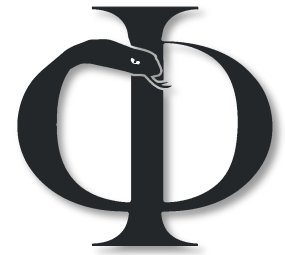
Remote Embodiment Disruptive Display



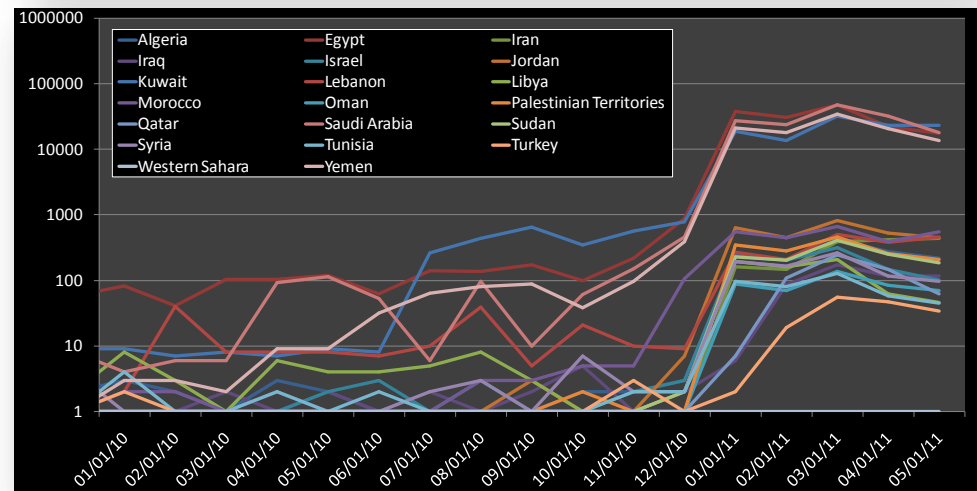
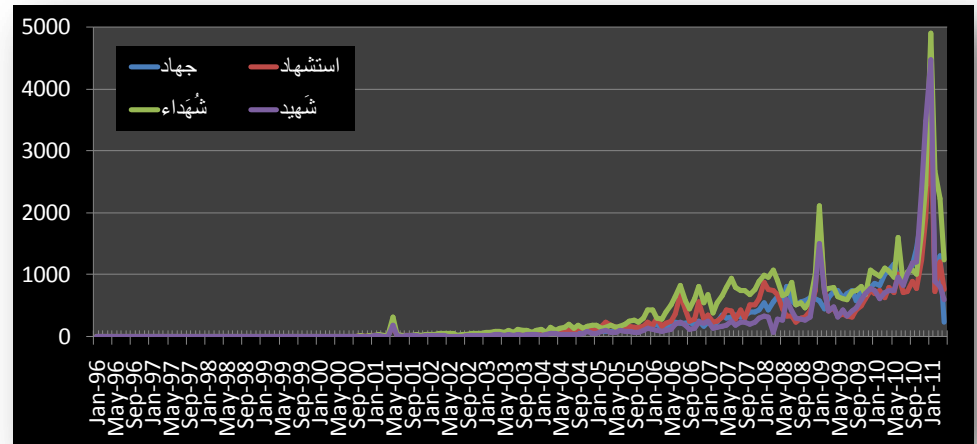
Remote Embodiment Supportive Display



OC in the Cyberspace

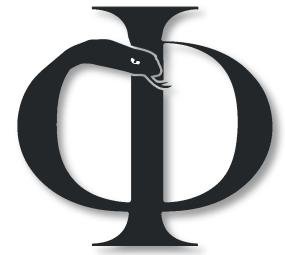


- The affect of the **NA** on the **Internet**
 - The **conception** of **freedom** and **privacy**
 - The **conception** of **access** to the **body** of **knowledge**
 - **Social networking** and **virtual life**
- The affect of the **Internet** on the **NA**
 - **Influence** and **counter-influence** operations
 - Data **manipulation** and **corruption**
 - The **power** of the indexing and search **services**
- Further research required.

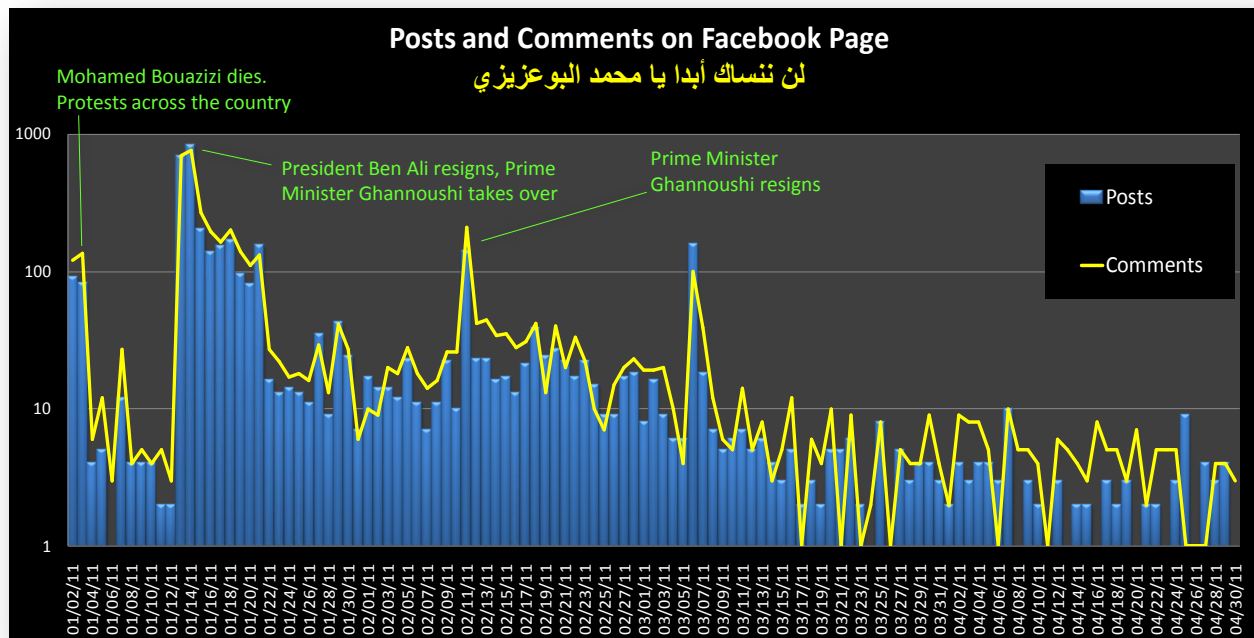


Morozov, E., *The Net Delusion : The Dark Side of Internet Freedom*. 2011, Philadelphia, PA: Perseus Books Group.

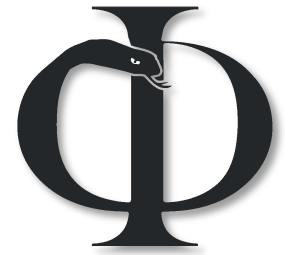
OC and C2 in Influence Operations (1/2)



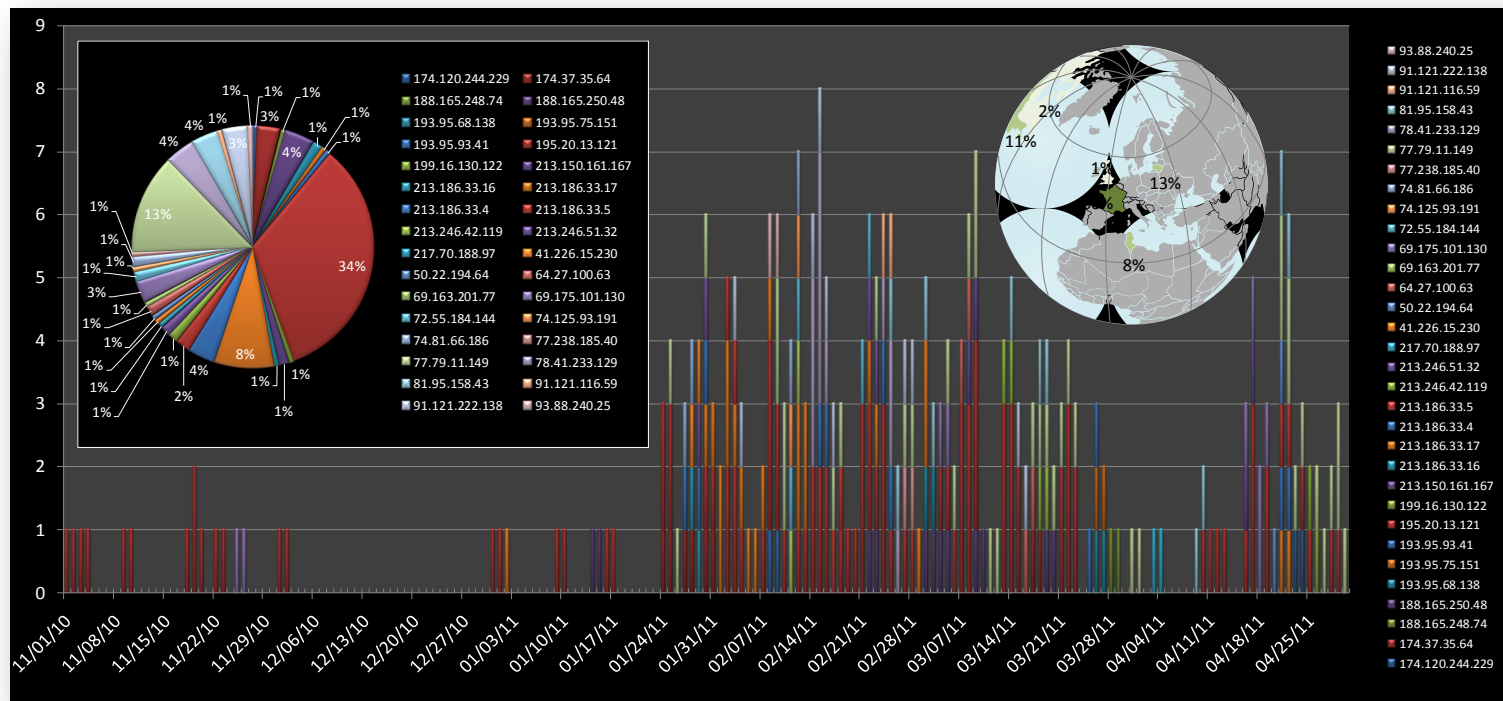
- **Mitigate** the **military NA** to ensure that organizational awareness, decisions, and actions **do not** lag behind the invisible changes of naturally-occurring and contemplated influence operations.
- OODA-oriented worldview is practically blind to **slow paced threats** and harmful **internal drifts**.



OC and C2 in Influence Operations (2/2)



- Initiate, execute, anticipate, and counteract **future influence operations** that may lead to or affect conventional conflicts.
- Conduct strategic **historical analyses** to determine what may be **unthinkable** in certain societies and could serve as a basis for a **strategic advantage**. Further research required.



Summary



- The notion of Organized Cognition (OC) refers to **intentional individual** and **collective** efforts to **obtain unbiased knowledge** of **semi-static** and **dynamic** aspects of the **constitution** of the **world** and the **natural attitude** of individuals, societies, or cultures.
- The notion of Organized Cognition (OC) enables
 - Improved **integration** and **extension** of existing C2-related concepts and constructs.
 - Awareness and possible mitigation of **basic problems** in C2 and C2-related concepts.
- Further **research required**.

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Thank You!

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